309

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M. CUMMING,
PRINCIPAL.

W. H. BRITTAIN,
PROVINCIAL ENTOMOLOGIST.

THE APPLE MAGGOT AND THE BUFFALO TREE-HOPPER.

The Apple Maggot

(*Rhagoletis pomonella Walsh*)

By W. H. Brittain, Provincial Entomologist.

This pest is not generally distributed throughout the Annapolis Valley, but destructive outbreaks have been found in the vicinity of Windsor and Digby, and slight infestation about Middleton. Traces of the insect can be found over a much wider range, but it has only become numerous enough to win notice in the places indicated. In some cases it has been responsible for the loss of the entire crop of susceptible varieties

The adult flies resemble a house fly somewhat in appearance, but the transparent wings are conspicuously crossed with black bands. The larva is a stout cream colored maggot and is devoid of head or legs. The pupa is about the size of a wheat grain and almost the same color.

The flies begin to appear about the middle of July, but the time varies greatly with the locality and the season.

The eggs are not laid for some time after the fly emerges, the time depending on the temperature. Our observations show that as long a period as two weeks may elapse between emergence and egg-laying, though the period may be considerably shorter. During this period the fly feeds

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upon the gum and juices on the surface of the fruit, and seems to have the power of making use of solid substances by means of saliva ejected from the mouth. The solid substances are dissolved in the saliva and then sucked up by the fly. The foregoing facts are important to keep in mind, since on them our control measures are based.

The eggs are deposited beneath the skin, within the pulp of the apple and hatch in about six days. The time spent in the larval state varies greatly according to variety, temperature, etc. Larvae keep emerging from the apple during the latter part of August, September and October, and many are caught undeveloped by the frost in November. The work of the maggot causes the apples to fall prematurely and we have never known of a case in which the larva emerged from the fruit while it was still on the tree. The larvae enter the soil for a short distance, where they transform to pupae, in which state the winter is passed. Strange to say a large proportion of the flies do not emerge the next season, but pass another year in the pupal state before emerging.

Work of the Larvae in the Fruit.

Immediately upon hatching the maggot begins to work in the pulp of the apple. Although there is no true head, there are two strong chitinous hooks on either side of the mouth, with which the maggot rasps the cells of the apple pulp. The liberated juices are then absorbed and the dead cells turn dark, forming the brown tunnels. In the case of the apples that are still growing when the eggs are laid, the work is later indicated by corky strands extending through the pulp, as the tunnels are quick to heal over after being made.

As the fruit begins to ripen the maggots grow rapidly and extend their tunnels in every direction, until frequently the fruit becomes completely honey-combed by their work. In many cases, barrels of apparently sound fruit have been shipped in entire ignorance of the fact that they contained maggots, which, when they reached their destination, were reduced to a rotten, spongy mass. This was due to the fact that the apples had commenced to ripen in transit, thus accelerating the development. Needless to say fruit infested with maggots is quite useless for marketing purposes. Even the evaporators refused fruit from orchards known to be infested.

The work of the apple maggot is frequently confused with that of the codling moth or apple worm, though in reality there is little resemblance. The codling moth

usually enters by the blossom end and bores straight downwards to the core, around which it feeds, finally emerging by means of a tunnel straight out at the cheek of the apple. It does not bore through and through the pulp of the apple making the brown tunnels so characteristic of the maggot, but confines itself largely to the region of the core.

The resemblance of the maggot injury to the so-called "bitter pit" disease is more striking. This disease is characterized by brown corky strands extending through the pulp of the apple, and usually by brown sunken areas on the surface. There are, of course, no real tunnels present, nor any sign of punctures in the fruit, as is the case when the maggot is actually responsible for the work.

Control.

The method formerly recommended for the control of this pest was the prompt picking up and destruction of the fallen fruit. This method, if persisted in, will eventually result in the eradication of the pest, but it is a laborious and tedious process.

We have had very good success from the use of poisoned sprays, applied as soon as the flies begin to appear., which should be repeated if the spray should be washed off by heavy rains. Either arsenate of lead or arsenate of lime are satisfactory, but the latter, if used alone, causes severe foliage injury and should only be used in conjunction with lime sulphur or Bordeaux.

In order to determine the time when the flies begin to emerge, a good plan is to place a large number of maggot infested apples in a barrel with a few inches of earth in the bottom, cover the top of the barrel with cheese cloth and, as soon as the first flies appear the next July, apply the spray. Good results should be obtained by simply deferring the last summer spray, (usually applied when the apples are about the size of acorns) for an extra week or so, particularly if flour paste is added as a sticker.

The Buffalo Tree-Hopper.

(Ceresa bubalus Fab.)

By W. H. Brittain, Provincial Entomologist.

A number of tree hoppers are known to deposit their eggs in the twigs of the apple and pear, but the buffalo tree-hopper is the only species that causes any particular harm by so doing. This is a peculiar triangular insect with the front angles of the thorax produced into horn-like projections, which gives to the insect an appearance suggestive of the name it bears. The nymphs are a brownish grey in color, triangular in shape and the dorsal surface is beset with strong spines.

Injuries.

The damage is done by the female bug in depositing her eggs in the twigs and smaller limbs. Two slightly crossed incisions are made close together and into these incisions are inserted numbers of eggs, which lie in a double row beneath the bark. As the wound thus made begins to heal, the scars enlarge with the growth of the limbs, which then present a very unsightly appearance. Young fruit trees growing in sod, are frequently severely checked in this way, and even the young growth of older trees may suffer to some extent.

Life History.

Only the egg state is spent in the apple and pear, the nymphs feeding upon certain weeds that grow in the orchard but chiefly upon the sheep sorrel (Rumex acetosella). The insects reach maturity through the latter half of August and September and shortly afterwards the eggs are laid. They remain in the egg state during the winter months, hatching in the spring or early summer into the strongly spined nymphs that drop to the ground, seek their food plants and continue feeding throughout the summer.

It was noted that they preferred to feed on the tender growth of sorrel, that developed under the shade of tall grass and did not care for situations exposed to the light where the growth would naturally be more woody. This explains the fact that the damage from these insects is done to orchards wholly or partially in sod.

Control.

The control of the pest consists in the destruction of the weeds upon which the nymphs feed.